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ABSTRACT

This curriculum unit on oceans for grades K-8 contains lesson plans, vocabulary lists, core activities, resource lists, and a student evaluation worksheet developed by rural Gallatin County, Montana, teachers as part of an inservice Rural Schools Integrated Curriculum Project administered by the Montana State University College of Education. The integrated approach serves the need of small rural multigrade classes for a unified approach to teaching and learning. The curriculum unit is designed so that teachers can expand it to accommodate all school subjects and specific student interests. Rationale and seven general objectives are followed by a list of core activities in reading, math, science, social studies, art, music, and health/physical education for each of three sub-units--plants and animals, industry, and transportation. Lesson plans organized by school subject and sub-unit are further divided into grade levels and lesson objectives. Each lesson plan lists objectives, activities, resource materials, and, where appropriate, instructions for an experience chart as well as a scope of lesson statement. Lesson plans separate activities by grade level where appropriate as well as offer integrated activities for all grades. A vocabulary list and resources list are divided by subject and K-4/5-8 grade levels. (LFL)

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OCEANS

A Multi-Age, Integrated Subjects Curriculum Unit

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Rural Schools Integrated Curricula Project

Generated by the Gallatin County Rural Schools and the Teachers' Resource Center, College of Education, Montana State University

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William D. Hall
Project Director

September 1985

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RC015685

RURAL SCHOOLS INTEGRATED CURRICULA

SUMMARY

Nineteen rural teachers (K-8) from twelve districts located in Gallatin County, Montana, participated in a year long inservice project on developing thematic, multi-age, integrated subject curriculum units.

There were four phases to the project. Phase 1 consisted of three, day long inservice sessions that focused on basic skills in language arts, science and mathematics. These sessions were carried out so that the participants would be better able to incorporate basic skills development into the curriculum units they would be developing later in the project. Phase 2 consisted of learning a process for developing the integrated teaching units and actually developing them. The format followed for developing the units consisted of: 1) selecting a broad based theme; 2) developing a rationale statement justifying why the unit should be taught; 3) identifying appropriate sub-themes for the selected unit theme, by grade level K-8; 4) generating core activities by subject for reading/language arts, mathematics, science, social studies, art, music and physical education. These core activities outlined the possible scope of the unit; 5) writing lesson plans that specifically relate back to the identified core activities. These lesson plans consisted of a general focus statement, specific behavioral obectives, designated classroom activities, materials needed lists and teacher log section; 6) generation of appropriate vocabulary to be taught for each sub-unit; and 7) identification of resources needed, both material and human. The curriculum development phase of the project consisted of seven, all day sessions, with numerous, out of class hours of work. The culmination of this effort were four teaching units, entitled: 1) Gallatin History - Past to Present; 2) Oceans; 3) Outer Space; and 4) Weather.

Phase 3 brought three elementary education professors from Montana State University out to the rural schools to field test the units in the rural schools. Specific parts of each unit developed were selected, and then team or co-taught with the participating rural teachers in the project.

Phase 4 brought selected rural teachers to the campus of Montana State University so they could speak with college classes in teacher education about these types of units, and the benefits of teaching with thematic, multi-age, integrated subject curriculum units.

The benefits of utilizing this type of teaching-curriculum approach include: A more unified approach to teaching and learning, since all of the school subjects are associated to a common theme; efficiency of time because more than one subject can be taught at the same time; multi-age teachers involving all of their students, whatever their grade, in fairly common topics (the theme threads throughout each sub-unit); and increased excitement on the part of the students.

As a result of the Northwest Area Foundation funding the Rural Schools Integrated Curricula Project for $10,000, representative rural teachers of Gallatin County, Montana, have learned a process for developing these kinds of teaching units and copies of each of the four units developed have been distributed to each participating school. In addition, three copies of each unit will also be housed in the Teachers' Resource Center on the campus of Montana State University, for checkout purposes, for teachers located anywhere in the state of Montana.

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* This table of contents only lists the order of the contents with reference to a tab number. Page numbers are not included. Each section and step is designed so that additional material can be added in the future, thus making the traditional numbering of pages useless. As teachers use and expand this resource, they only need to add on to the specific section they are concerned with. For example, if an additional science lesson is written for one of the sub-units, you simply place it at the end of the already developed science lessons in that sub-unit. This does not affect the numbering system, since each subject area always begins with page 1.

PREFACE

By design, this K-8 multi-age, integrated subject teaching unit will always be able to be expanded. The theme, " Oceans," is broad in scope and when coupled with all of the school subject areas, offers limitless options for expansion.

This unit outlines the theme so that a teacher can begin to teach with it. As the teacher envisions additional lessons and/or ideas, he/she can add to the already existing material. It is suggested that as teachers expand these units, they follow the format provided.

The unit is organized in the following way:

I.	Rationale	The statement justifying the need to teach the unit.
II.	Sub-units	Sub-strands of the original theme organized by grade level or range.
III.	General Objectives	Broad goals for the unit.
IV.	Core Activities	Specific types of activities, by subject, to be developed in the lesson plans. These core activities form the overall broad scope of the unit.
V.	Lesson Plans	Specific plans for teaching, that designate behavioral objectives, procedures to follow, materials and a section for teacher notes.
VI.	Vocabulary	Lists of vocabulary words are included in each unit. Sometimes these words are developed and listed with each sub-unit, and at other times they are listed only at the end of the entire unit. Some vocabulary lists are coded to a key for word attack through structural analysis. This key is located with the vocabulary lists.
VII.	Resources	Accompanying each unit is a list of available resources, both material and human, that can be utilized with the respective unit.
VIII.	Evaluation	A form to be utilized when assessing student performance on specific objectives.

ACKNOWLEDGEMENTS

I wish to especially thank all of the teachers involved in this project, for their tireless efforts and patience as they worked throughout the year. Special thanks to Vanetta Burton, who spent countless hours typing this material into our word processing system. It's amazing that you could keep all of this organized. Special acknowledgement is due Peg Nelson, who assisted in the editing of this material. Without your help this project would have been much more difficult to complete. We all appreciated the contributions made by Dr. Gerald Sullivan and Dr. Paul S. Markovits, who helped make sense out of the language arts and sciences. And, thank you Margaret Brown, Gallatin County Superintendent of Schools, for your cooperation in making this project possible. Thank you all.

We are also indebted to the Northwest Area Foundation, for funding this inservice project. Without your financial support, this project would not have been possible.

W.D.H.

PARTICIPANTS

The following teachers met throughout the 1984/85 school year to participate in the "Rural Schools Integrated Curricula" Project. This inservice project culminated with the development of teaching units on Gallatin History - Past to Present; Oceans; Weather and Outer Space.

Sandy Visser	Amsterdam School
Nancy Drusch	Amsterdam School
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Lyn Morton	Gallatin Gateway School
Gladys Kauffman	Heritage Christian School
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Dr. William D. Hall	Project Director Curriculum Development/Mathematics Education Department of Elementary Education Montana State University
Vanetta Burton	Administrative Aid Teachers' Resource Center College of Education Montana State University

UNIT: OCEANS

Grade Levels K-8

Step I. Rationale:

Seventy-one percent of our earth - almost three-quarters - is covered with water. Most of the earth's population lives by the ocean. For these people the ocean serves as a food source, highway for commerce, and a recreational area. Even to those of us who live far from the ocean, its influence on daily life is great. With a better understanding of the ocean we may wisely utilize its great wealth of resources.

Step II. Sub-units:

1. Plants and Animals (K-8)
2. Industry (K-8)
3. Transportation (K-8)

Step III. General Objectives:

1. To provide a learning laboratory that focuses on the ocean, and is problem solving oriented.
2. To develop students' awareness of the importance of the oceans in their daily lives.
3. To enhance students' understanding of the relationships of the oceans to living organisms.
4. To develop an understanding of man's limitations and boundaries - past and present - and ways that he has solved problems or transcended boundaries.
5. To understand man's efforts to manipulate the ocean environment to serve his needs.
6. To comprehend main geographical features in and about the world's oceans.
7. To provide students with information which would enable them to make wise decisions about the oceans for the future of humanity.

UNIT: OCEANS

Step IV. Core Activities: Plants and Animals (Grade K-8)

A. & B. Reading and Language Arts

1. Read and discuss books.
2. Research and report.
3. Experience creative stories or poems.
4. Write reports, stories, and sentences.
5. Develop vocabulary.

C. Math

1. Design problem solving situations.
2. Prepare charts and/or graphs.
3. Investigate geometric patterns.
4. Study measurements of life forms.
5. Classify life forms.
6. Perform computational problems.

D. Science

1. Develop the concept of eco-systems emphasizing food chains and animal habitats (i.e., shells).
2. Identify sea animals.

E. Social Studies

1. Learn about animal communities.
2. Plot the migration of sea life.

F. Art

1. Create an underwater environment in the classroom.
2. Create tissue paper seascapes.

G. Music

1. Listen to musical recordings of ocean and animal sounds.
2. Experience ocean songs (i.e., John Denver's "Calypso").

H. Health and Physcial Education

1. Learn how to swim.

UNIT: OCEANS

Step IV. Core Activities: Industry (Grades K-8)

A. & B. Reading and Language Arts

1. Explore marine resources used by man and present a written or visual statement of their findings.
2. Use the information as a basis for developing grammar, syntax and language usage.
3. Evaluate and synthesize researched information in a written form.

C. Math

1. Expand the concept of currency.
2. Review base 10 concept and place value.
3. Construct charts and graphs.
4. Use calculator to solve problems.
5. Practice computational skills.
6. Comparison of sets.
7. Practice reading engine gages and interpret their meanings.

D. Science

1. Explore the benefits of oceanic research.
2. Inventory the effects of industry on the environment.
3. Discover how the ocean floor was formed.

E. Social Studies

1. Learn how communities are dependent upon, and affected by the oceans.
2. Explore communication skills.

F. Art

1. Create through the handmade print process.
2. Create an underwater environment.

G. Music

1. Experience unified motion through rhythm.

H. Health and Physical Education

1. Simulate machinery using movement activities.

UNIT: OCEANS

Step IV. Core Activities: Transportation (Grades K-8)

A. & B. Reading and Language Arts

1. Investigate the use and design of boats.
2. Explore various personalities involved in seafaring, both fictional and nonfictional.
3. Prepare and participate in skits and plays.
4. Examine the motivation behind exploration.

C. Math

1. Study time.
2. Investigate distance between seaports.
3. Apply the metric system in problem solving situations.
4. Use estimation in problem solving.
5. Use calculators to solve problems.
6. Solve appropriate computational problems for both whole and factional numbers.

D. Science

1. Examine properties of liquids.
2. Recognize effects of weather on travel.
3. Explore sources of fuel that make travel possible.

E. Social Studies

1. Examine cultures whose livelihood depends on maritime transportation.
2. Construct maps plotting routes of early explorers or traders.

F. Art

1. Construct two-dimensional art forms.
2. Construct three dimensional art forms.

G. Music

1. Learn sailing songs and/or rhythmic activities.

H. Health and Physical Education

1. Participate in creative movement and/or dance forms.
2. Research effects of diet on early sailors.
3. Study the basic food groups.
4. Study the human body.

UNIT: OCEANS

Step V. Lesson Plans

Sub-Unit: Plants and Animals - Grades K-8

READING/LANGUAGE ARTS: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Construct a book using the sub-units.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Write a statement or paragraph summarizing facts learned from reading a story or book.	1.1 Select books from libraries and display in a reading corner. 1.2 Read to the class ISLAND OF THE BLUE DOLPHINS, discussing various forms of plant and animal life as they occur in the story. 1.3 Students will choose various plants and animals and read about them. 1.4 Students will write a sentence or two in paragraph summarizing something they learned while reading.	1.1 Library books on the topic of marine plants and animals.	1.1 ISLAND OF THE BLUE DOLPHINS, by O'Dell, Scott. 1.4 Early primary children will need to be led by the teacher in writing a chart story, etc.
2. Report (in writing) and illustrate areas of interest from readings.	2.1 Write complete paragraphs about their plants and animals. 2.2 Edit and correct each paragraph. 2.3 Rewrite it correctly. 2.4 Illustrate paragraph.		
3. Construct a book.	3.1 Learn how books are bound. 3.2 Bind the reports together to form a book. 3.3 Leave finished book in class library.	3.1 Ask a librarian to explain this process to class. 3.2 Cardboard for cover, contact paper.	

READING/LANGUAGE ARTS: Plants and Animals - Grades K-1
ASSIGN. SCOPE OF LESSON STATEMENT Use questioning skills to develop creative thinking.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Ask questions appropriate to identified theme.	1.1 Introduce "Shamu," and explain his ability to answer questions about the ocean. 1.2 Ask students to use tape recorder to ask Shamu any questions they have about the ocean. 1.3 Set aside a certain time each day for Shamu's answers.	1.1 Set up reading center with Shamu and tape recorder. 1.3 Use tape recorder to record Shamu's answers.	1.1 "Shamu" - stuffed whale.

READING/LANGUAGE ARTS: Plants and Animals - Grades 2-4
ASSIGN. SCOPE OF LESSON STATEMENT Use their questioning skills to develop creative thinking.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Write questions appropriate to a selected story shared with a group.	1.1 Introduce "Shamu," and explain his ability to answer questions about the ocean. 1.2 Ask students to write down any question they have for Shamu and put them into box. 1.3 Set aside a certain time each day for Shamu's answers.	1.1 Set up reading center with Shamu, paper, and box for questions. 1.3 Use tape recorder to record Shamu's answers.	1.1 "Shamu" - stuffed whale.

READING/LANGUAGE ARTS: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Generate creative stories and poems.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Write various creative poems and stories about Marine life that would fit on a postcard.	1.1 Brainstorm adjectives that describe marine life.		
	1.2 Use these words to write a poem. (Cinquaine or Haiku).		
	1.3 Create and present a short story, puppet show, or play about marine life.		
	1.4 Create a story that can be made into a filmstrip story.	1.4 Use filmstrip kit and tape recorder to record story.	1.4 Filmstrip making kit: roll of clear filmstrip, "Sharpie" pens. Can do a filmstrip story with the tape recorded story. Use for sequencing.
	1.5 Write postcards to parents from students living on the ocean floor.	1.5 Real postcards, stamps.	Mail them.

READING/LANGUAGE ARTS: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT 1. Generate interest in study of plants and animals.
2. Familiarize students in plants and animals.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Express interest in unit by reading or listening to selections, and discussing them.	1.1 Select books and magazines to display in room.	1.1 Library books, magazines, encyclopedias, audio-visuals. See: Resource list for Ocean: Plants and Animals.	
	1.2 Read some selections orally to class. Assign silent reading of others. Present films. Discuss.		
2. Describe plants and animals. Will answer questions to guided reading.	2.1 Have students read for information about plants and animals. Pose questions to be answered and discussed following reading.		2.1 Develop list of questions on work cards.

READING/LANGUAGE ARTS: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Read ocean fiction books for enjoyment.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Read fiction selections. Will distinguish facts upon which fiction is based.	1.1 Select books and stories from which students may choose. 1.2 Discuss and report.	1.1 Fiction books and stories. Examples: ISLAND OF THE BLUE DOLPHINS, O'Dell, Scott. MOBY DICK, Melville, Herman. (Children's adaptation available in Science-Math Resource Center). "Rhyme of Ancient Mariner." GINN 720 Level 11, "Why the See is Salt," (play). GINN 720 Level 12, "The Last Frontier."	1.1 Develop book report form.

READING/LANGUAGE ARTS: Plants and Animals - Grades 6-8
ASSIGN. SCOPE OF LESSON STATEMENT Introduce use of the "Reader's Guide to Periodical Literature."

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Explain the format and use of the "Reader's Guide to Periodical Literature."	1.1 Discuss periodicals and how they are abbreviated in guide. Discuss format of guide and how it is used. Make a chart of abbreviations of terms used (months, etc.).	1.1 Sample page of "Reader's Guide to Periodical Literature." Language text lesson if available.	1.1 Make copies of a page of the "Reader's Guide to Periodcal Literature." Have materials for chart making or overhead available.
2. Demonstrate use of "Reader's Guide" by locating articles on plants or animals.	2.1 Visit public library if "Reader's Guide," is not available in school library. Practice skills of using guide in game format; e.g., give students slip of paper with subject and instruct to locate an article on the subject.	2.1 "Reader's Guide to Periodical Literature." Library with resource person available to locate periodicals. Activity materials.	2.1 Make arrangements to visit public library, or junior high library. If back issue magazines are not shelved a resource person must be available to locate periodicals. Design game to give students practice in locating periodicals in "Reader's Guide."

READING/LANGUAGE ARTS: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Review indexing skills in locating information on plants or animals.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Recall format and use of indexes.	1.1 Review skills of using an index. Discuss vocabulary. Main entry, subentry, volume and page numbers, illustration or photographs, cross reference.	1.1 Sample entries, encyclopedia, etc., see resource list.	1.1 Overhead transparencies of index entries.
2. Apply indexing skills in locating information.	2.1 Have students choose a plant or animal, and locate information using indexing skills.	2.1 THE OCEAN WORLD OF JACQUES COUSTEAU, Danbury Press, World Publishing Co., 1973. Volumes 1-19, 20-Index, Bozeman Public Library. Encyclopedias. See Resource List of Ocean Plants and Animals.	

READING/LANGUAGE ARTS: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Review outlining, summarizing, classifying, and notetaking skill by researching a plant or animal.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Demonstrate outlining, summarizing, classifying, and notetaking skills in preparing a research report on a plant or animal.	1.1 Prepare students by reviewing skills. Work together on each step of outlining, summarizing, classifying, and notetaking as needed. Discuss format of final report. Provide research and writing time in class with teacher assistance as needed.	1.1 See Resource List for Ocean Plants and Animals. Encyclopedias.	1.1 This lesson follows Reading/Language Arts: Plants and Animals, pp. 3-4. Prepare outline form.

READING/LANGUAGE ARTS: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Appreciate mythology.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Listen to myths.	1.1 Share myths with students.	1.1 Books of ocean myths. Examples: THE OCEAN WORLD OF JACQUES COUSTEAU, A LEA OF LEGENDS: INSPIRATION FROM THE SEA. Volume 3, Danbury Press, 1973. Bozeman Public Library.	
2. Write myths.	2.1 Discuss natural phenomena upon which myths are based, as well as origins. Direct students to write myths explaining an animal or plant.		

READING/LANGUAGE ARTS: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Introduce or review poetic forms.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Recognize poetic forms.	1.1 Discuss forms and read examples. Practice writing with class.	1.1 Common poetic forms. See Resource List. Film: MP 476 14 min., "Haiku," IJH Color. Department of Instructional Media, Bozeman Public Schools.	
2. Write a poem about an ocean plant or animal.	2.1 Instruct students to write poems using a chosen form.		2.1 Prepare poems and/or illustrations for display.

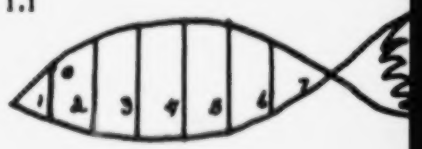
READING/LANGUAGE ARTS: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Generate creative stories.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Write creative stories.	1.1 Have students draw from pictures of plants or animals. Encourage them to imagine themselves as that organism and to write their feelings about survival in today's environment.	1.1 Pictures of plants and animals.	1.1 Collect pictures, posters, etc., of plants and animals.

MATH: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Create story problems.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Design and write verbal and written problems about plants and animals.	1.1 Introduce or review <, >, =. 1.2 Utilize symbols to write problems from 1.1. 1.3 Write story problems utilizing <, >, =. 1.4 Share these problems with another student. 1.5 Revise and correct. 1.6 Collect for reference.		--

MATH: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Compare sizes.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Compare (re. - measures) the differences and similarities among marine life.	1.1 Measure everything inside desk. 1.2 List the items measured. 1.3 List the shortest item first and the longest item last. 1.4 Compare measrements with various plants and animals. 1.5 Share these findings with another student	1.1 Use a fish pattern with centimeters marked on it to measure. 1.4 See Plants and Animals, Reading 2.4.	1.1 

MATH: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Organize data into graphs, charts.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Construct a graph.	1.1 Make a pictograph from the information obtained in Plants and Animals, Math, p. 1, 1.4.	1.1 Graph paper, markers.	

MATH: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Compare geometric shapes to marine life.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Draw geometric shapes which occur in marine life.	1.1 Introduce basic shapes using the flannel board.	1.1 Flannel board, shapes: circle, square, rectangle, triangle.	
	1.2 Compare basic shapes with pictures of marine life.	1.2 Library books in reading corner.	
	1.3 Use construction paper shapes to make images of marine life.	1.3 Construction paper, scissors.	

MATH: Plants and Animals - Grades 2-4
ASSIGN. SCOPE OF LESSON STATEMENT Classify animals and plants.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Classify plants and animals.	1.1 Brainstorm specific characteristics of marine life.		
	1.2 Gather pictures from magazines.	1.2 RANGER RICK, SCIENCELAND, WORLD, NATIONAL GEOGRAPHIC.	
	1.3 Place pictures into the various groups according to identified attributes.		
	1.4 Display on a bulletin board or table.		

MATH: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Create ideas for problem solving involving plant and animal theme.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Recall mathematic operations and concepts.	1.1 Discuss operations, key terms, and formulas. Encourage students to brainstorm creative applications to plant and animal life. Examples: addition, subtraction, multiplication, division, estimates, decimals, measurement, geometry, integers, fractions, graphing, proportion, per cent.	1.1 Math texts, blackboard/chalk, or chart/markers.	1.1 Record formulas and ideas as for formulated. Examples: Rate x Time = Distance (rt=d). Integers above and below sea level.
2. Design verbal and written problems about plants and animals.	2.1 Have students compose problems using the varied ideas of objective 01.		2.1 Copy and compile students' problems into a booklet for redistribution and review.

MATH: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop the understanding of charts and graphs.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Construct charts or graphs.	1.1 Examine examples of charts and graphs. Practice drawing, emphasizing use of scale, keys, etc.	1.1 See Resource List of Ocean Plants & Animals. Examples: OCEANOGRAPHY, p. 17 (ocean temperatures). THE OCEAN WORLD OF JACQUES COUSTEAU, pp. 94-97.	

MATH: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Compare geometric patterns.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Recognize geometric shapes and symmetry and draw representations from marine life.	1.1 Discuss and review geometric shapes and symmetry. Draw main shapes mirrored from marine life. 1.2 Example: Draw representation of sand dollars by drawing a circle and dividing it into six equal parts with a compass.	1.1 Math texts, drawing materials, pictures of marine life. 1.2 Example: sand dollar, compass.	1.1 Have books with pictures and photos of marine life available. (Check availability of posters, shell collections). 1.2 Example: MATHEMATICS AROUND US, Grade 7, Scott, Foresman, 1975, pp. 133, 146-147. (Construction of circles, circle designs, and central angles).

MATH: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Review sets.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Interpret classification of plants and animals in terms of sets.	1.1 Discuss sets and vocabulary. (Intersection of sets, disjoint sets, etc.). Have students draw representations of sets based on classification.	1.1 Drawing materials or chalkboard.	1.1 The lesson follows Plants and Animals, Social Studies, p. 2.

SCIENCE: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Develop an understanding of the food chain.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Draw pictures that organize and depict food groups.	1.1 Discuss plankton and its importance in the food chain.	1.1 Use THE MARINE BIOLOGY COLORING BOOK by Thomas M. Niesen, p. 18. Also use color transparency, p. 7, from OCEANOGRAPHY," Milliken Publishing Co.	
	1.2 Explain the food chain comparing land food chains with ocean food chain.	1.2 Play the "Food Chain" card game to reinforce the concept.	
	1.3 Draw pictures showing food chains.	1.3 Paper, markers.	

SCIENCE: Plants and Animals - Grades 2-4
ASSIGN. SCOPE OF LESSON STATEMENT Investigate animal habitats.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Discover specific inhabitants of the various levels of the ocean.	1.1 Use overhead and transparencies to show levels and dwellers. 1.2 Examine sea shells to see variety of habitats. 1.3 Examine books to learn the dwellers of certain levels in the ocean.	1.1 Use transparencies from OCEANOGRAPHY," Milliken Publishing Co., pp. 3,7, 8. 1.2 Variety of sea shells.	
2. Identify specific animals that live in Kelp beds.	2.1 Use ISLAND OF THE BLUE DOLPHIN to help discuss this habitat. 2.2 Discuss various sea creatures that live in Kelp beds.	2.1 ISLAND OF THE BLUE DOLPHINS, by Scott O'Dell. 2.2 THE MARINE BIOLOGY COLORING BOOK by Thomas M. Nielsen, p. 8.	
3. Identify specific dwellers of coral reefs.	3.1 Examine pieces of coral pointing out the sharp edges and irregularities. 3.2 Discuss the variety of fish, etc., that inhabit the coral reef.	3.1 Examples of coral. 3.2 Use THE MARINE BIOLOGY COLORING BOOK by Thomas M. Nielsen, p. 9.	
4. Discover if coloration affects animal habitats.	4.1 Discuss the basic colors of fish. 4.2 Find out about changing color--- "advertisers." 4.3 Find out how some fish change color to camouflage themselves. 4.4 Compare coloration with habitats. 4.5 Show comparisons on a bulletin board or on a poster.	4.1 Use THE MARINE BIOLOGY COLORING BOOK by Thomas M. Nielsen, pp. 49-57. 4.5 Colored paper, markers, scissors, poster board.	

SCIENCE: Plants and Animals - Grades 2-4
ASSIGN. SCOPE OF LESSON STATEMENT Identification of variety of sea animals.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Discover and discuss basic characteristics of various sea creatures.	1.1 Brainstorm for names of sea animals.	1.1 See Reading: Plants and Animals, Grades K-4, p. 1, 1.1, also magazines. See Math: Plants and Animals, Grades 2-4, pp. 5-12.	1.1 otter, sealion, dolphin, seals, walrus, elephant seal, whales, octopus, squid, starfish, turtles, crabs, sharks, fish
	1.2 Place them into groups.		
	1.3 Assign several students to research each group.		
	1.4 Ask them to report back to class by use of pictures, information, models, etc.		
	1.5 Show filmstrip for identification of animals and also to show food chains.	1.5 LIFE IN THE SEA: a) "Life Near the Shore;" b) "Life in the Open Sea," National Geographic Society.	

SCIENCE: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop the concept of food chain and food web.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Comprehend food chains and food webs within ocean ecosystems.	1.1 Have students read to discover patterns of food chains and webs. Discuss and draw examples with class.	1.1 See Resource List of Ocean Plants and Animals. Examples of books: THE STORY OF OCEANOGRAPHY, Ch. 5, "The Oceans Alive," pp. 39-45. THE SEA AROUND US, "The Surface of the Sea," pp. 21-22. OCEANOGRAPHY AND OUR FUTURE, Ch. 13., "Drifters of the Sea," pp. 106-115. Filmstrip, "Life in the Sea."	
2. Demonstrate knowledge of food chain and food web patterns by playing game and drawing charts.	2.1 Play "Food Chain" card game.	2.1 IDEAS AND INVESTIGATIONS IN SCIENCE. Idea 11:4 on pp. 364-374 "Predator," and "The Food Chain Game," manuals and card game, Science-Math Resource Center.	
	2.2 Design and construct own set of cards, similar to cards in 2.2. Draw plants and animals on cards. Play game.	2.2 Blank playing cards, pens/markers, resource books of plants and animals.	
	2.3 Draw food chain charts, labeling each step.	2.3 Drawing materials.	2.3 Post charts and drawings.

SCIENCE: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Create an understanding of habitat.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Explain habitat as it relates to ocean's ecosystems.	1.1 Discuss meaning of habitat especially as related to ocean animals.	1.1 See Resource Life of Ocean Plants and Animals. OCEANOGRAPHY AND OUT FUTURE, Ch. 11-12, pp. 90-105. HOMES BENEATH THE SEA. THE LIFE OF THE OCEAN.	
2. Identify regions of the ocean, and plants and animals that live in each.	2.1 Have students draw or describe oceanic regions and animal and plants in those regions.		

SOCIAL STUDIES: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Learn about animal communities.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Investigate the elephant seal and its rookery.	1.1 Use overhead and transparency to develop the understanding of the rookery.	1.1 THE MARINE BIOLOGY COLORING BOOK by Thomas M. Niesen, p. 75. make an overhead transparency.	1.1 Vocabulary: rookery bull cow pup beachmaster.
2. Investigate animals that reflect a symbiotic lifestyle.	2.1 Explain the relationship of the anemonefish and the sea anemone.		2.1 Symbiosis: a situation in which 2 dissimilar organisms live together in a mutually beneficial relationship.
	2.2 Use coloring page from book to reinforce.	2.2 THE MARINE BIOLOGY COLORING BOOK by Thomas M. Nielsen, p. 78.	
3. Discover how some fish have defense mechanisms and their benefits.	3.1 Discuss the squid and its use of an "inky" substance for escape. 3.2 Find out about how spines help the lionfish, stonefish and porcupine-fish.	3.1 Use THE MARINE BIOLOGY COLORING BOOK by Thomas M. Nielsen, pp. 83-87.	

SOCIAL STUDIES: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Develop an understanding of the migration of sea life.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Plot the migration of whales.	1.1 Use the overhead and transparency to explain the migration of the gray whale from California to Alaska. 1.2 Trace the route on a large pull-down map. 1.3 Create a game in classroom. One corner designated as California, and opposite one as Alaska. 1.4 Teacher should cite various circumstances that could occur in a gray whale's life as students decide where they should "migrate." A discussion could be had confirming reasons why they migrated to either California or to Alaska.	1.1 THE MARINE BIOLOGY COLORING BOOK by Thomas M. Niesen, p. 74. Make an overhead transparency. 1.2 Large pull-down map in classroom showing California, Canada, and Alaska.	
2. Compare migration of whales with migration of otters and other sea animals.	2.1 Use resource books and magazines from resource list to find out migratory patterns. 2.2 Plot these paths too. 2.3 Trace the routes of each and compare with gray whale.	2.1 Books from Reading: Plants and Animals, Grades K-4, 1.1 and also those from resource list. 2.3 Use large pull-down world map.	

SOCIAL STUDIES: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop the concept of migration.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Recognize and identify migration routes of animals.	1.1 Assign reading to discover animals' migration characteristics. Discuss, emphasizing food chains, ocean currents, climate, etc.	1.1 See Resource List of Ocean Plants and Animals. Examples: THE FISHES, Ch. 6, "The Wondrous Journeys of Fish," pp. 101-111, (eels, tuna, salmon, bass). THE LIFE OF THE OCEAN, pp. 81-91, (whales, plankton). FILM: MP422, "Animal Migration," Department of Instructional Media, Bozeman Public Schools.	
2. Plot migration routes.	2.1 Have students trace migration routes, labeling important physical characteristics also, (seas, oceans, currents, continents, countries, etc.).	2.1 Blank world maps.	

SOCIAL STUDIES: Plants and Animals - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop the concept of taxonomy and classification.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Understand system of classification and taxonomy.	1.1 Introduce and discuss hierarchial arrangement of classification: Kingdom, Phylum, Class, Order, Family, Genus, Species.	1.1 See Resource List of Ocean Plants and Animals, 1.1. Examples: THE OCEAN WORLD OF JACQUES COUSTEAU, Vol. 20, Ch. VI, "Filing Sea Life," pp. 72-87. OCEANOGRAPHY AND OUR FUTURE, Ch. 14-18. OCEANOGRAPY, pp. 22-23 (shells).	
2. Identify characteristics and classify animals and plants.	2.1 Practice classifying skills, emphasizing physical characteristics and grouping in hierarchy.		
3. Demonstrate classification skill in playing game.	3.1 Play classification game.	3.1 IDEAS AND INVESTIGATIONS IN SCIENCE, Biology - 2nd Ed. Idea 2:5. Manuals and card set, Science-Math Resource Center.	

ART: Plants and Animals - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an underwater environment in the classroom.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Create soft sculptures of marine animals.	1.1 Choose various animals and observe shapes from pictures.	1.1 Library books, magazines; e.g., RANGER RICK, WORLD, SCIENCELAND.	
	1.2 Using large pieces of paper, draw the shape of the animal.	1.2 Paper on rolls, crayons, markers, scissors.	
	1.3 Color.		
	1.4 Cut out, cutting 2 pieces at once.		
	1.5 Staple around the edge, 3/4 of the way.		
	1.6 Stuff with crinkled up newspaper.	1.6 Newspapers.	
	1.7 Finish stapling.		
	1.8 Attach string and hang from ceiling.	1.8 String.	
2. Create realistic seaweed.	2.1 Hang strips of green crepe paper strips from ceiling.	2.1 Green crepe paper.	
3. Create "port holes" for windows.	3.1 Cut the center out of paper plates.	3.1 Paper plates, colored construction paper, plastic wrap.	
	3.2 Cut out various plants and animals from colored paper.		
	3.3 Arrange on place, glue.		
	3.4 Cover entire plat with plastic wrap.		
	3.5 Display on windows.		

ART: Plants and Animals - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop artistic development.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Make tissue paper collages.	1.1 Show an example of finished product. 1.2 Explain the process. 1.3 Distribute materials. 1.4 Students will create underwater scenes with this art form. 1.5 Display finished product.	1.1 12" x 18" white paper, variety of colored tissue paper, glue or liquid starch.	

MUSIC: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Experience ocean songs.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Learn "ocean" songs.	1.1 Listen to various ocean related songs. 1.2 Learn the words to and sing various "ocean" songs.	1.1 John Denver's "Calypos." 1.2 "Calypso," "Four Strong Winds, "Michael, Row the Boat Ashore."	

MUSIC: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Listen to musical recordings of animal and sea sounds.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Make line drawings reflecting mood created by music.	1.1 Listen to recordings to create a mood; either calm, or stormy. 1.2 Students can make line drawings as they listen to the recordings showing how they make them feel.	1.1 "Environments," recordings of ocean waves.	1.1 Contact Hillary Donaldson, Ophir School.

MUSIC: Plants and Animals - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop appreciation of music.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Listen to musical recordings of ocean sounds of animals.	1.1 Present recordings and have students identify sounds.	1.1 See Resource List Oceans. Recordings, Hillary Donaldson. Ophir School.	
2. Produce animal life sounds on recordings.	2.1 Have students try to reproduce ocean sounds and animal sounds; e.g., whales, etc.	2.1 Cassette recorders and blank cassettes.	

HEALTH AND PHYSICAL EDUCATION: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Learn how to swim.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Learn the basic swimming strokes.	1.1 Arrange for a series of swimming sessions so that instruction of the basic strokes can be completed.	1.1 Use of a swimming pool.	1.1 Bozeman Swim Center or Bozeman Hot Springs.

HEALTH AND PHYSICAL EDUCATION: Plants and Animals - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Play "ocean" games.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Learn how to play "Octopus."	1.1 Students line up on edge of playing area. 1.2 Two people are "it." They stand with one foot in hoola hoop in center of area. 1.3 When they call "Octopus" the rest run to other side while they try to touch them. If touched, they become octopus too.	1.1 2-3 hoola hoops.	1.1

UNIT: OCEANS

Step V. Lesson Plans

Sub-Unit: Industry - Grades K-8

READING/LANGUAGE ARTS: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Develop organizational skills.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Brainstorm and develop a list of occupations.	1.1 Show pictures of harbor scenes. 1.2 Write a list of activities seen in the pictures.	1.1 Magazines, books. 1.2 Chalkboard.	
2. Classify activities according to related occupations.	2.1 Using the concept of sets. Group the activities according to skills performed.	2.1 Chalkboard.	
3. Construct a display showing the skills needed in performing a selected occupation.	3.1 Choose an occupation. Make a display of the skills used in performing a given job. 3.2 Select an occupation they would like to do. Using books, magazines and audio visual materials, develop a list of skills needed for given job. 3.3 Organize the list according to importance of the skill. 3.4 Construct a display using visual and written aids. The display should include the following: a) A title of the occupation; b) Four to six drawings of the skills needed in performing this occupation; c) Written explanations accompanying each illustration.	3.1 Large newsprint, markers, pictures from magazines. 3.2 Books, magazines, film strips, movies. 3.4 Large newsprint, markers, pictures, paint.	3.1 Do this as an example of the desired result with the class. 3.2 This list may be completed in the form of drawings or cut out pictures in the K-1 grades and writing in the 1st through 4th.
4. Demonstrate an understanding of their material by presenting an oral report.	4.1 Each student is to discuss with the class the occupation and its related skills.		

READING/LANGUAGE ARTS: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Develop an alphabetized word bank.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Compile a vocabulary list related to a specific area of study.	1.1 During the completion of this unit the student will select seven - twenty terms related to maritime activities. 1.2 Each student will write the chosen words on notecards and include the following: a) entry word; b) pronunciation; c) definition; d) a sentence showing the word's meaning. 1.3 Each set will be arranged in alphabetical order.	1.2 Note cards and file box.	1.2 To make alphabetizing easier be sure to use indexing cards in the file box.
2. Construct and complete a word search.	2.1 Construct a word search.	2.1 Large graph paper.	2.1 The lower grades may receive help from a partner.
3. Construct and complete a crossword puzzle.	3.1 Construct a crossword puzzle. Use the definitions as the clues.	3.1 Large graph paper.	

READING/LANGUAGE ARTS: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an understanding of the ocean's resources and potential.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Visualizes setting, character, and events.	1.1 Read "The Kelp Forest."	1.1 "The Kelp Forest," from THE HYDRONAUTS, by Carol L. Biemiller. (See Diversity Reader, Houghton Mifflin).	
2. Brainstorm and generate lists of ideas about underwater living.	2.1 Discuss the idea of an underwater city. 2.2 List advantages and disadvantages of living underwater. 2.3 Discuss problems to be solved; e.g., water pressure due to depth, oxygen, etc.).	2.2 Pencils, notebooks, chart or overhead.	

READING/LANGUAGE ARTS: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Comprehend the possibilities of man living underwater.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Apply reference and writing skills in developing a research paper.	1.1 Find solutions to a list of problems in underwater living. 1.2 Review how to write a research paper.	1.1 Assorted library books, science texts and encyclopedias on oceanography.	1.1 Refer to Oceans: Reading/LA 7 & 8, Geography, p. 1.

MATH: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Develop the concept of money.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Identify the value of various coins and bills.	1.1 Provide time to examine the characteristics of each coin.	1.1 Coins of various values - play money and real money.	
	1.2 Make rubbings of the various coins. Use both sides, write their value next to each.	1.2 Paper, pencils, coins of various values.	
	1.3 Perform on various worksheets, using pictures of coins and matching their values.	1.3 Teacher prepared worksheet and student text.	1.3 Use pennies or values of one as the base for counting before using 5 cents and 10 cents to form value combinations.
2. Count by 2's, 5's, 10's.	2.1 Make stacks of pennies starting with 2's and then 5's and finally 10's. Provide time for pairs of students to set up problems for their partners to count.	2.1 Play money.	2.1 Write the 2's, 5's, and 10's on the board as a guide to facilitate counting.
	2.2 Provide worksheet for further practice in counting.	2.2 Teacher prepared and or student text.	
	2.3 Problem solve using counting methods.	2.3 Teacher prepared worksheets.	2.3 Idea for the problems can be taken from the text and rewritten using industry as the theme.
3. Exchange coins of one specific value for combinations of coins of various values.	3.1 Display a coin and ask the students to use other coins to equal the given value.	3.1 Play money.	3.1 Be sure the student understands the value of each coin. Record the possible combinations on the board. Begin counting with coins with the highest value.
	3.2 Have the students count each value outloud.		
	3.3 Provide worksheets where the student can match possible combinations with a coin of a given value.	3.3 Teacher prepared worksheets or student text.	

MATH: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Develop the concept of money (continued).

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
4. Set up a store and buy items from the store to take on a voyage by boat.	4.1 Assemble items from catalogues of items that would be useful on a ship. Cut out the pictures or draw them and place the items on index cards. Place a value of each item on the card.	4.1 Catalogues, newspapers, drawing paper, markers, index cards.	4.1 Prices of the items should be kept under $1.00 for the lower grades. For grades 3-4 values up to $20.00 may be used. Each student can find 2 items from the following categories: food, clothes, tools, communication.
	4.2 Construct a cardboard store front and place the items on the cardboard.	4.2 Large sheet of cardboard, markers, paint, brushes.	4.2 Draw in advance the sections you wish to emphasize: food, clothes, tools, communication.
	4.3 Allow small groups to play store and use money to buy items from the shelves.	4.3 Play money and store front.	4.3 Groups should be kept to no more than 4. It maybe helpful to have an older student work with the younger ones. Each student should be allowed to be storekeeper.
	4.4 Provide a series of worksheets showing items in the store and combinations of money. They will then match the combinations with the item of equal value.	4.4 Teacher prepared worksheets.	4.4 Variations for the older students can include making change, determining whether they have enough money, how much more money is needed to buy and item.
	4.5 Provide the students with a given amount of money and determine which items they can buy. They will write down the item and its amount and then show which coins they would use to buy each item.	4.5 Teacher prepared worksheets, play money.	
5. Use calculators to solve problems involving money.	5.1 Discuss the uses of calculators.	5.1 Teacher prepared worksheet, calculator.	5.1 Explain the ways calculators can can help but be sure to emphasise that a tool is no substitute for knowledge.
	5.2 Demonstrate the use of a calculator.	5.2 Teacher prepared worksheet, calculator.	5.2 Same as above.
	5.3 Provide worksheets. Use money problems and solve using calculators.	5.3 Teacher prepared worksheet, calculator.	5.3 Same as above.

MATH: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Provide experience in the use of graphs and charts.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Demonstrate an ability to read and construct graphs to display information.	1.1 Collect and display various types of graphs and charts. To include: 1. bar graph; 2. line graph; 3. circle graph; 4. picture graph.	1.1 Magazines, newspapers.	1.1 RANGER RICK, WEEKLY READER. Various weekly news magazines offer a rich source of materials.
	1.2 Discuss ways in which graphs can be used and the parts of a graph. Students will label a worksheet on parts and types of graphs.	1.2 Overhead projector, worksheet.	
	1.3 Provide the student with a set of data concerning types of animals caught by fisherman. Discuss ways in which this material can be displayed.		
	1.4 Provide a worksheet which displays the various types of graphs.		
	1.5 On the worksheet place the information on the graphs.	1.5 Teacher prepraed worksheet and questionaire.	
	1.6 Provide a worksheet displaying information and a questionaire from which the student will obtain specific data.	1.6 Teacher prepared worksheet.	1.6 With the K-1 grade students this will be done orally. Review 1.1 - 1.5 worksheets before doing 1.6.

MATH: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an awareness of the ocean's features and depth.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Organize data into graph format.	1.1 Review how to prepare a line graph. 1.2 Prepare graphs depicting the depth of the ocean floor.	1.1 EARTH SCIENCE, Silver Burdett, Chapter 13. CHALLENGES TO SCIENCE, EARTH SCIENCE, McGraw Hill, Chapter 9. Graph paper, pencils.	1.1 EARTH SCIENCE and CHALLENGES found at the Science-Math Resource Center.

MATH: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an awareness of the ocean's features and depth.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Determine, from the data collected, whether the rope method is an accurate way of measuring the depth.	1.1 Use the rope method to measure depth.	1.1 EARTH SCIENCE, Silver Burdett, Activity 21, p. 282. Metric tape measure, spool of string, weight.	1.1 EARTH SCIENCE found in the Science-Math Resource Center.
2. Organize data into graph format.	2.1 Prepared line graphs depicting depth.	2.1 Graph paper, pencils.	

SCIENCE: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Examine the use of simple machines.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Classify simple machines according to the work they help us do.	1.1 Discuss the need and use of simple machines. 1.2 Organize machines according to the jobs they help us perform. 1.3 Cut out and glue pictures of machines into sets according to the simple machines they represent.	1.1 Filmstrip, movie. 1.2 Prepared cards with an assortment of tools shown. 1.3 Tool catalogues: Sears, Wards.	
2. Experiment with the wedge, lever, ramp, pulley and gear.	2.1 Use the wedge to seperate or split objects. 2.2 Use the lever to lift open or remove a given object. 2.3 Use ramp to aid in moving a heavy object. 2.4 Use the pulley to lift or move an object. 2.5 Use a set of gears to control the movement of an object.	2.1 Wedge, hammer, knife, chisel, nail, boards, log. 2.2 Bottle opener, iron bar, fulcrum, hammer, board and block for a teeter-totter. 2.3 Boards, one long one, several smaller blocks. 2.4 Pulleys of various types. 2.5 Come-along, gears. SCIS has a unit on gears. Old wind-up alarm clock.	
3. Discuss and label diagrams of simple machines.	3.1 Provide the students with diagrams of different simple machines. Have them label the part. 3.2 Provide the student with a worksheet showing various tools. Have them tell what kind of machine is used and label the parts.	3.1 Prepare ditto. 3.2 Prepare ditto.	

SCIENCE: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Comprehend how depth affects water pressure.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Observe the effects of water pressure.	1.1 Cover cup and lower into tank of water. 1.2 Observe changes. 1.3 Make a hole in cup with nail. 1.4 Observe changes. 1.5 Place 3 holes in milk container and cover with tape. Fill container with water. Remove tape. 1.6 Observe changes.	1.1 EARTH SCIENCE, Scott Foresman, Activity p. 485. Plastic foam cup, rubber band, cm ruler, milk container, nail, tape, sink, tank of water, rubber sheet to cover cup (use surgical glove).	1.1 EARTH SCIENCE found at Science-Math Resource Center

SCIENCE: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an understanding of the ocean's resources and potential.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Observe how minerals are removed from seawater.	1.1 Remove salt from water by distillation.	1.1 EARTH SCIENCE, Scott Foresman. Activity p. 410. Flask, stopper, glass tube and jar, bowl, bunsen burner, ring-stand with clamp, salt, food coloring, water, ice cubes, safety glasses.	1.1 EARTH SCIENCE found at Science-Math Resource Center.

SOCIAL STUDIES: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Examine lifestyles of two cultures which rely on oceans as their main resource.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Listen to selected material to obtain information.	1.1 Read material on Eskimos and Polynesian. Selections should include material on: a) family life; b) occupations; c) travel; d) food; e) clothing.		1.1 This material can be paired according to themes. Read a selection on the family structure of the Eskimo and on the Polynesian. Discuss and contrast the similarities and differences. Each one of the themes will be handled as one lesson.
	1.2 Provide the students with a opportunity to illustrate and explain in written form the similarities and differences for each of the themes.		
2. Read to obtain information (Grades 2-4).	2.1 Provide resources from which the student can obtain information.		

SOCIAL STUDIES: Industry - Grades K-4

ASSIGN. SCOPE OF LESSON STATEMENT Examine lifestyles of two cultures which rely on oceans as their main resource (continued).

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
3. Assemble the material and present it in book form.	3.1 Prepare a table of contents. List the main themes and page number. 3.2 Organize the drawings and written material in the order shown in the table of contents. 3.3 Sew or staple the material in book form. 3.4 Display the books in some prominent place.	3.3 Construction paper, needle, thread, white paper, stencils.	3.1 It maybe useful to pair the lower grades with the upper to help with the written part. 3.2 The page numbers in the table of content will be supplied after the book is assembled. Begin each section with a title heading.
4. Construct a model of a chosen aspect of one of the cultures.	4.1 Brainstorm ideas and list various items from the 2 cultures that can be constructed. Ideas may be: a. Housing; b. modes of travel; c. model villages; d. dioramas; e. print making; f. jewelry.	4.1 a) housing: igloos - sugar cubes, huts - straw/popsicle sticks. b) Travel: clay, cloth, straw, popsicle stick, leather. c) Model Village: boxes, paint, clay, straw, popsicle sticks, paint brushes, markers. d) Diorama - same as model villages. e) Printmaking: linoleum, heavy tag board, ink brayers, spoons, scissors. f) Jewelry: feather, thin leather, beads, bone, glue.	4.1 Restrict the options for K-1 to models of houses, modes of travel, dioramas and prepare the steps to follow in advance.

SOCIAL STUDIES: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an awareness of the ocean's features.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Interpret flat maps, geographical locations, and relations.	1.1 Construct and label maps of the ocean floor.	1.1 CHALLENGES TO SCIENCE, EARTH SCIENCE, McGraw Hill, Chapter 9. Paper, rulers, protractors, compasses, pencils. EARTH SCIENE, Silver Burdett, Chapter 13.	1.1 CHALLENGES and EARTH SCIENCE found in the Science-Math Resource Center.
2. Make decision based on data.	2.1 Decide on location for underwater city.		

SOCIAL STUDIES: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an awareness of the location and establishment of settlements in response to community needs.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Recognize community areas and their purposes.	1.1 Design an underwater "model city" based on research.	1.1 Graph paper, pencils, rulers, compasses, protractors, triangles, T-squares, drafting boards.	1.1 Refer to Reading/LA: Oceans - Geography - 7-8, p. 2.

ART: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Design personal stationary using block prints.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Design and construct a block print to embellish their own stationary.	1.1 Select 1-4 images of ships.	1.1 Magazines, books.	
	1.2 Transfer the images to thin linoleum. Use carbon paper. Draw directly. Cut and glue image.	1.2 Linoleum, carbon paper, grease pencils, glue, scissors, paper.	
	1.3 Cut out the linoleum and glue onto heavy cardboard backing.	1.3 Scissors, cardboard.	
	1.4 Using a nail, scratch in the necessary details.	1.4 Nails, scissors, gauges.	1.4 Older, more mature students may be allowed to use printer's gauges only under supervision.
	1.5 Using block printing techniques, print the images.	1.5 Tempra paint, printers ink, brushes, brayers spoons, heavy drawing paper.	1.5 Plan in advance a place where the prints can dry.

ART: Industry - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Construct a diorama of a harbor scene.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Draw a landscape.	1.1 Each student will draw a harbor scene based on information taken from pictures. Include the following: four different store fronts, a wharf, 2 ships, and people at work.	1.1 Magazines, rulers, markers, paint, drawing paper.	1.1 This scene may be derived from any culture, or time period that interests the individual student.
2. Construct a diorama.	2.1 Draw and paint the back ground of the harbor. Include the appropriate elements from the drawing in objectivity.	2.1 Boxes of varying sizes, tagboard, paint, markers, brushes.	
	2.2 Cut out and construct the following: a) a rectangular box for a wharf; b) two - four flat cut outs of ships; c) any machinery used on a wharf.	2.2 Boxes of varying sizes, tagboard, paint, markers, brushes.	
	2.3 Paint the material in activity 2.2.	2.3 Boxes of varying sizes, tag board, paint, markers, brushes.	
	2.4 Assemble the harbor scene attaching the wharf, ships and machinery.	2.4 Boxes of varying sizes, tag board, paint, markers, brushes.	

ART: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an awareness of the ocean's features.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Interpret maps, geographical locations, and relations.	1.1 Create an underwater model of maps. 1.2 Slowly fill the aquarium with colored water. 1.3 Observe changes; e.g., islands form and disappear.	1.1 Clay, aquarium, water, food coloring.	1.1 Refer to Social Studies: Oceans - 7-8, Geography, p. 1.

ART: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an awareness of the location and establishment of settlements in response to community needs.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Build 3-dimensional models.	1.1 Build an architectural representaton of an underwater "model city."	1.1 Plywood, cardboard, plastic wrap, clear pyrex bowls, clay, papier mache, spools, cartons, and other "odds and ends."	1.1 Refer to Social Studies: Oceans 7-8, Geography, p. 2.

MUSIC: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Appreciate the natural rhythm and music in the sounds of the ocean.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Identify melodic characteristics.	1.1 Listen to the music of waves on the shore.	1.1 "Environments," recording of the seashore (produced by Syntonic Research, Inc., Atlantic Recording Corp, 1841 Broadway, NY, NY 10023.	
2. Create their own "water melodies."	2.1 Have students bring in containers that hold water. 2.2 Experiment with various water levels in containers and the sounds they create. 2.3 Compose melodies by combining groups. 2.4 Share with class.		

HEALTH AND PHYSICAL EDUCATION: Industry - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Develop an awareness of the symptoms and causes of caisson disease.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Become aware of the control and prevention of a disease.	1.1 Read about caisson disease (also known as "the bends").	1.1 Encyclopedia, dictionary.	

UNIT: OCEANS

Step V. Lesson Plans

Sub-Unit: Transportation- Grades K-8

READING/LANGUAGE ARTS: Transportation - Grades K-2
ASSIGN. SCOPE OF LESSON STATEMENT Create an understanding of various types of vessels.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Recognize several types of vessels and their uses.	1.1 View a film on ships. Students will answer questions either orally or written depending on ability. 1.2 Read and discuss the types of ships and boats and their uses.	1.1 Bozeman Public Schools Film Library. 1.2 School library, Bozeman Public Library. SHIPS AND BOATS, Let's Discover Series," Vol. 813, Raintree Publishers. WOODEN SHIP, Adkins, Jan. Boston, Houghton Mifflin, 1978. SHIPS OF COMMERCE: LINERS, TANKERS, FREIGHTERS, FLOATING GRAIN ELEVATORS, TUGBOATS, Colby, C.B., New York: Coward, 1963.	
2. Prepare a booklet on ships.	2.1 Make a list of ships. 2.2 Select a sailing ship. 2.3 Draw its shape.	2.1 Experience chart. 2.3 Construction paper, drawing paper, pencils, etc.	2.1 Ketch, Barkentine, Schooner, Brig.

READING/LANGUAGE ARTS: Transportation - Grades 3-6
ASSIGN. SCOPE OF LESSON STATEMENT Create an understanding of various types of vessels.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Recognize various types of ocean-going vessels.	1.1 Watch and listen to a film on ships.	1.1 BOATS AND SHIPS, 10 min. P-I, Educational Film Locator, 1980. SHIPS: A FIRST, film, 11 min., P-I.	1.1 Includes a "visit" to the wheelhouse of an ocean liner and to a shop where the children see models of various types of crafts. Compares ships to show similarities and differences in large commercial vessels and defines roles of people who work.
	1.2 Answer questions, either orally or in writing.		
	1.3 Bring in library books to show and read.		
	1.4 Read and discuss the uses of ships.		
2. Make booklet displaying information gathered.	2.1 Cut out or draw various types of boats.		
	2.2 Mount (or draw) the boat pictures on the pages to make up booklet.		
	2.3 To enhance booklet, make a decorative cover page with appropriate design.		
	2.4 Staple, sew or otherwise fasten pages together to form booklet.		

READING/LANGUAGE ARTS: Transportation - Grades 7-8
ASSIGN. SCOPE OF LESSON STATEMENT Create an understanding of various types of vessels.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Recognize several types of vessels and their uses.	1.1 View a film on ships. Students will discuss film listings main points. 1.2 Research on 5 different types of ships and boats. Illustrate each type. Write a paragraph for each vessel's illustration.	1.1 Bozeman Public Schools Film Library. 1.2 School library, Bozeman Public Library. Drawing paper, pens and pencils.	

READING/LANGUAGE ARTS: Transportation - Grades 5-8
ASSIGN. SCOPE OF LESSON STATEMENT Investigate personalities involved in seafaring.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Appreciate characters in literature that are connected with the sea.	1.1 Discuss several characters, fiction and nonfiction, which the students are familiar with.		
	1.2 List new and unknown personalities.	1.2 Experience chart.	1.2 John Paul Johns, Robert Fulton, John Ericsson, John Fitch.
	1.3 Research their chosen character.	1.3 Library books from school, Bozeman Public Library.	
	1.4 Write a biographical sketch of character and either draw person or come dressed as the character.	1.4 Paper, pencils.	

READING/LANGUAGE ARTS: Transportation - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Experience understanding of sea characters through drama.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Write a skit or play featuring ocean travel.	1.1 Read, silently or aloud, a variety of stories involving seafaring characters. 1.2 Discuss suitability of episodes for dramatization and select one. 1.3 Identify character parts and work together writing dialogue. Research for authenticity. 1.4 Supply necessary background information.		
2. Employ drama skills to present play.	2.1 Assign character parts and other responsibilities to various individuals. 2.2 Memorize parts and practice presentation of play. 2.3 Invite parents and interested friends to view performance of the play. 2.4 Perform the play.		

READING/LANGUAGE ARTS: Transportation - Grades K-4
ASSIGN. SCOPE OF LESSON STATEMENT Investigate personalities involved in seafaring.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Investigate an American folk hero.	1.1 View filmstrip, grades K-4. 1.2 Color a picture and write or dictate a caption for picture. Grades K-2. 1.3 Write another adventure for Alfred Bulltop Stormalong. Grades 3-4.	1.1 ALFRED BULLTOP STORMALONG: DEEPWATER SEAMAN, SVE, Singer Co.	

READING/LANGUAGE ARTS: Transportation - Grades 3-6
ASSIGN. SCOPE OF LESSON STATEMENT Create understanding of motives prompting exploration.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Discover reasons for explorations.	1.1 Teacher and students together will make a list of late 15th and 16th century explorers. 1.2 Match explorers' names with the countries that sponsored them. 1.3 Identify the reason each country had for sending the various expeditions.	1.1 History text books.	
2. Analyze motives for the explorations.	2.1 Using the information gathered in activites 1.1 - 1.3, list in one column all the expeditions sent out for economic reasons and the reasons. 2.2 In another column, list any explorers or expeditions sent out for reasons other than economic. Write down the reasons.		
3. Give specific information identifying economic role in world expansion.	3.1 Together discuss information collected. What effect did economic motivation have on scope and time of exploration?		

MATH: Transportation - Grades K-2
ASSIGN. SCOPE OF LESSON STATEMENT Understand the concept of time.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Know the names of the days of the week. Kindergarten can say the names. First grade can read and write them correctly.	1.1 Make a weekly calendar, labeling the days. 1.2 Memorize the days of the week through nursery rhyme.	1.1 Ditto master with weekly calendar and days of week on it.	

MATH: Transportation - Grades K-2
ASSIGN. SCOPE OF LESSON STATEMENT Use the metric system in measurement.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Measure various objects using the centimeter.	1.1 Using centimeter rulers students will measure the length of various objects. 1.2 Measure toy boats (See 2.2).	1.1 Chalk, pipecleaners, nails, yarn, pencils, paper, centimeter rulers.	
2. Measure water using liter containers.	2.1 Obtain a tub. 2.2 Have students bring in toy boats. 2.3 Fill the tub with water by counting the liters it takes to fill the tub at given marks. 2.4 Sail the boats, having races, etc.	2.1 Large wash tub. 2.3 Liter containers.	2.3 Record information on chart as to the number of liters it takes to fill the tub; fill in information on the chart. Note: 2nd graders might use other containers; i.e., one group could use cups or quarts, pop bottles, etc., but record on chart.
3. Measure toy boats using balance scales.	3.1 Set up the balance. 3.2 Weigh various boat combinations.	3.1 Balance scale in grams objects from room, toy boats.	

MATH: Transportation - Grades 3-6
ASSIGN. SCOPE OF LESSON STATEMENT Create problem-solving situations to develop computational skills.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Practice basic computational skills.	1.1 Using a map, measure distances from one seaport to another; e.g., from London to New York; London to Calais; New York to Newport, etc. 1.2 Design problems involving comparison of distances. 1.3 Decide on a basic "cost per mile." 1.4 Design problems involving comparison of cost. 1.5 Make worksheets depicting the problems. 1.6 Employ computational skills to solve problems.	1.1 Maps, rulers, pencils, paper.	

MATH: Transportation - Grades 3-6
ASSIGN. SCOPE OF LESSON STATEMENT Develop familiarity and proficiency with metric system.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Demonstrate need for uniform system of weights and measurements.	1.1 Measure pupils and objects using a variety of standards: hand length; arm length; feet and inches, etc. 1.2 Discuss difficulties resulting from different standards.		
2. Perform measurements with centimeters, decimeters, and meters.	2.1 Using tagboard, each pupil will make rulers. The first will be one decimeter long, marked off into centimeters.	2.1 Tagboard, ruler with standard metric measurements, pencil or pen.	
	2.2 Using these rulers, students will measure a variety of objects.		
	2.3 Again using tagboard, students will make a ruler 10 decimeters long and use it for measuring longer, larger objects.	2.3 Tagboard, meter stick, pencil or pen.	
	2.4 Students will make up problems using statistics gathered and submit them to each other for solving.	2.4 Paper, pencil, information from activities 2.2 and 2.3.	

MATH: Transportation - Grades 7-8
ASSIGN. SCOPE OF LESSON STATEMENT Create problem-solving situation to develop computational skills.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Write and compute story problems involving time and distance.	1.1 Students will construct story problems concerning ocean voyages.	1.1 Encyclopedias, almanacs, and other various reference material.	1.1 Refer to Social Studies lesson for Transportation on mapping of major explorers and their voyages. 1.2 Also covers core activity 3.
	1.2 Worksheet combining time and metric distance.	1.2 See attached sheet.	
	1.3 Use world maps to identify distances from sea port to sea port. Have students decide on average speeds so they can determine time at sea.		1.3 Introduce idea that time is spent at port. This also becomes part of the time it takes to travel, in addition to time at sea. Use maps from TRC: 1. World maps; 2. The world makes an automobile map (to aid in deciding on products to export); 3. World atlas map showing time zones.

SCIENCE: Transportation - Grades 3-6
ASSIGN. SCOPE OF LESSON STATEMENT Evaluate properties of liquids.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Compare liquid properties.	1.1 Students brainstorm and list all the liquids they can. 1.2 Examine samples of various liquids and list characteristics of each: clear, colored, thin, thick, odorless, "smell," etc.		
2. Identify properties of ocean water.	2.1 Determine which of the above characteristics apply to oceanwater. 2.2 List these characteristics. 2.3 Using science books, encyclopedia and other resource books available, research other properties of ocean water. 2.4 Identify and list salts in sea water. 2.5 Explain why ocean water is salty. 2.6 Describe what happens to ocean minerals when the water evaporates. 2.7 Pour about one cup water into a saucepan and add 3 tablespoons salt. Place over burner and bring to a boil. As water boils, note what happens to water and salt. 2.8 Set a cup in the middle of a glass bowl. Pour one cup water with 3 tablespoons salt into bowl. 2.9 Cover bowl tightly with plastic wrap. Place a marble on the wrap over the center of the cup. Place bowl in sun. Note what happens to the water in the bowl. What kind of water do you find in the bowl? In the cup?	2.2 Chart paper or overhead. 2.3 OCEANOGRAPHY AND OUR FUTURE, Oxhorn and Goldfield. 2.7 Saucepan, water, salt. 2.8 Glass bowl, cup, water, salt, plastic wrap, marble.	2.3 Science-Math Resource Center.

SCIENCE: Transportation - Grades 3-6
ASSIGN. SCOPE OF LESSON STATEMENT Evaluate properties of liquids (continued).

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
	2.10 Discuss the idea of air mixing with ocean water. 2.11 Oxygen and carbon dioxide are gases. Discover how much of the world's oxygen comes from the oceans (85%). 2.12 Report your findings to the class.	2.11 Science books, encyclopedias.	

SCIENCE: Transportation - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Evaluate properties of liquids.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Develop the concept of cohesion.	1.1 On a 12" square of wax paper, using a dropper put 3-4 drops of water on paper. Push drops of water around with pencil. Discuss what happens. List properties.	1.1 Quart milk carton, water, pencil or nail, ruler, glass or plastic tumbler, medicine dropper, pan, 12" squares of wax paper.	1.1 Complete activities found in TEACHING SCIENCE THROUGH DISCOVERY.
2. Investigate water pressure.	2.1 Refer to sub-unit on Industry, Science lesson for this activity.		

SCIENCE: Transportation - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Explore overall relationships between weather and travel.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Identify weather types.	1.1 Together brainstorm and make a list of the different kinds of weather.	1.1 Paper, pencil or chalkboard, chalk.	
2. Determine effect of wind.	2.1 Discuss effect of wind on ocean water.		
	2.2 Tie a piece of rope (about 15 feet long) to a door handle.	2.2 Rope. Place to secure it, (door handle).	
	2.3 Shake the free end of the rope up and down.		2.3 A wave will form along the rope. The wave moves along the rope, but the rope is still attached to the door handle.
	2.4 Discuss similarity between rope waves and sea waves.		2.4 It is the wave that moves, not the water.
	2.5 Define hurricane and discuss effect of a hurricane on a ship.	2.5 Dictionary.	2.5 What would happen to a boat or ship caught in high winds.
3. Describe effect of doldrums on sailing ships.	3.1 Define "doldrums."	3.1 Dictionary.	
	3.2 Experiment with a floating object on a large bowl or sink filled with water.	3.2 Bowl or sink of water, bathtub toy or some other object that will float.	
	3.3 Observe and verbalize effect of blowing against the object.		3.3 What happens when you stop blowing?
	3.4 Discuss the effect of doldrums on a sailing ship such as those Columbus used.		
4. Explore effects of fog.	4.1 Discuss personal experiences involving fog.		
	4.2 Pour a cup of water over a block of dry ice in a pail to create fog.	4.2 Pail, dry ice, cup of water.	
	4.3 Discuss hazards presented to ships by fog.		

SOCIAL STUDIES: Transportation - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Locate and investigate the Phoenician culture.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Locate Phoenicia on a map.	1.1 Discuss Phoenicia and locate on map. (All grades). 1.2 Research the following: ships, Baal, its civilization, early colonies. (Grades 5-8).	1.1 Wall map. 1.2 Encyclopedias, library books, story paper, theme paper, pencils, colored chalk.	
2. Apply the knowledge of Phoenicia to the writing process.	2.1 Dictate or write stories for a Phoenicia boat on a voyage. 2.2 Color a picture to illustrate story. (Grades 1-4).		

SOCIAL STUDIES: Transportation - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Create an understanding of maps and their functions.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Learn purpose and importance of maps.	1.1 Teacher will display a variety of maps and lead discussion on purpose and importance of maps.	1.1 Assorted maps of varying complexity.	
2. Label simple map.	2.1 Teacher will distribute simple maps of classroom to pupils to further demonstrate map use. Pupils will locate and label areas and furnishings on map.	2.1 Outline maps of classroom.	2.1 Complexity of map will depend upon grade level.
3. Construct and label maps.	3.1 Students will construct maps, varying from map of playground to route from home to school. 3.2 Make transition to globe, identify home town, state, nation, continent.	3.1 Paper, pencils, rulers. lower grades. 3.2 Globe.	3.1 Teacher will demonstrate and assist with use of ruler and measuring for
4. Learn names and locations of oceans.	4.1 After class drill, each student will locate and label oceans on outline map of world.	4.1 Outline maps of world.	4.1 Higher level students will also label continents and other natural features.
5. Plot routes of selected explorers.	5.1 Identify and list 15th and 16th century explorers. 5.2 On outline map of world, mark routes of selected explorers. 5.3 Clearly identify route with explorer.	5.1 History books, chart. 5.2 Outline map of world, colored pencils or markers.	

MUSIC: Transportation - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Experience music equated with sailing.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Sing song connected with sailing.	1.1 Learn words and melody to a seafaring song.	1.1 SILVER BURDETT MUSIC BOOK 7, pp. 392-393.	

HEALTH AND PHYSICAL EDUCATION: Transportation - Grades K-8
ASSIGN. SCOPE OF LESSON STATEMENT Evaluate the effect of diet on long term ocean travelers.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Research and list diet problems.	1.1 All grades discuss diet requirements.		
	1.2 Read about the pilgrims' first winter (Grades K-3).	1.2 A LIZARD TO START WITH, Ginn.	
	1.3 Research books for scurvy and rickets (Grades 4-8).	1.3 Encyclopedias.	
2. List necessary diet requirement missing from diet of early sailors (Grades K-8).	2.1 Chart basic four food groups (Grades K-3).	2.1 Science books, encyclopedias.	
	2.2 Design a meal which would prevent these diseases (All grades).	2.2 Posters, charts, etc.	

PHYSICAL EDUCATION AND MUSIC: Transportation - Grades 3-6
ASSIGN. SCOPE OF LESSON STATEMENT Recognize contribution of music in unifying movement.

OBJECTIVE	ACTIVITIES	RESOURCE MATERIALS	EXPERIENCE CHART
1. Understand mechanics of rowing a boat.	1.1 Display pictures of galley boats. Volunteers explain procedure for rowing a boat. 1.2 Focus attention on importance of simultaneous, equal force on opposite oars.	1.1 Science-Math Resource Center.	
2. Experience music as medium to synchronize movement.	2.1 March around room. What would be a simple way to keep in step? 2.2 Again, march around room, this time to music. Emphasize keeping in step. Arrange students rows as on opposite sides of a boat. To the accompaniment of music, students will simulate motion of rowing a galley ship.	2.2 Piano, tape recorder, playing music with march tempo, or simply vocal music of appropriate tempo.	

VOCABULARY KEY

Word Attack Strategy:

1. Phonics
2. Structural analysis
3. Experiential
4. Explanation related to experience
5. Sight word - exception
6. Acronym
7. Etymology
8. Homograph
9. Compound word

Level of Learning:

*	Known by teacher
**	Introduced to student
***	Reinforced or reintroduced
****	Mastered

Phonic Generalizations: (+ = In one syllable words or accented syllables...)

1a. +, if a word ends in a final "e" preceeded by a single consonant, the first vowel is usually long and the "e" silent.

Example: v c e

1b. +, a vowel in the final position is usually long.

Example: (c) v

1c. +, a vowel in the initial or medial position is usually short.

Example: (c) v c

1d. +, a vowel followed by an "r" is neither long nor short but "r" controlled.

Example: v r

1e. +, if two vowels are adjacent, the first is usually long, the second silent.

Example: (c) v v (c)

1f. +, an "i" followed by "gh" is usually long and the "gh" silent.

1g. +, when "o" is followed by "ld" the "o" is usually long.

1h. +, pronunciation of some words can only be determined through context.

1i. syllabic (c) v/c

1j. syllabic v c/c v

1k. vowel in an unaccented syllable usually has the schwa sound.

UNIT: OCEANS

Step VI. Vocabulary

PLANTS AND ANIMALS - GRADES K-4

aquatic

algae

ecosystem

environment

food chain

habitat

marine

niche

photosynthesis

phytoplankton

plankton (derived from Greek "wandering")

predator

species

zoo plankton

UNIT: OCEANS

Step VI. Vocabulary

INDUSTRY - GRADES K-4

artic
bar graph
bone
canoe
cents
circle
currency
current
dime
dollar/dollars
Eskimo
feather
fish
five
folcrum
graph
hammer
hut
ice
iceberg
igloo
industry
island
kayak
leather
lever
money
nickle
ocean
octopus
penny/pennies
Polynesian
pulley
quarter
ramp
rope
screw
screwdriver
seal
shark
snow
squid
ten
tropic
two
value
walrus
whale
wind

UNIT: OCEANS

Step VI. Vocabulary

INDUSTRY - GRADES 5-8

abyssal hills

abyssal plains

caisson disease

continental rise

continental shelf

continental slope

desalting

echo sounding

fathoms

guyot

mid-ocean ridges

module

salinity

seamounts

submarine canyons

submersibles

thermocline

trenches

UNIT: OCEANS

Step VI. Vocabulary

TRANSPORTATION - GRADES K-8

bow

bridge

capstan

comparison

centimeter

day

economic

expedition

explorer

galley

hazard

hovercraft

knot

liquid

merchant ship

motive

nautical

navigate

Phoenicia

simulate

statistics

week

UNIT: OCEANS

Step VII. Resources

PLANTS AND ANIMALS - GRADES K-4

Monforton Library

THE SEA LIBRARY, OPEN OCEAN FISH, Beauregard, Sue and Jill Fairchild. The Children's Book Company, 1982.

ANIMALS OF THE OCEANS, THE ECOLOGY OF MARINE LIFE, Angel, Martin and Tegwyn Harris. Two Continents Publishing Group, 1977.

THE MYSTERIOUS UNDERSEA WORLD, National Geographic Society, 1980.

Bozeman Public Library

CORAL REEFS, Darling, Lois and Louis. The World Publishing Company, 1963. (J551.4D).

EXPLORERS OF THE DEEP, Cox, Donald, W. Hamond, 1968. (J920Cox).

THE OCEAN LABORATORY, Spilhaus, Athelstan. Creative Educational Society, Inc., 1967. (J551S).

UNIT: OCEANS

Step VII. Resources

PLANTS AND ANIMALS - GRADES 5-8

Bozeman Public Library

WONDERS OF SPONGES, Jacobson, Morris K., and Rosemary K. Pang, New York, Dodd, Mead and Co., 1976. (Intermediate level).

ANIMALS OF THE SEA, Verite, Marcelle, Chicago, Children's Press, 1964. (Easy/color illustrated).

ANIMALS THAT LIVE IN THE SEA, Straker, Joan Ann. National Geographic Society, 1978. (East/color photo).

THE COLOR NATURE LIBRARY: SEA LIFE, Burton, Dr. Maurice and Jane Burton. Crescent Books, 1978. (Intermediate/color photo).

HOMES BENEATH THE SEA, Arnov, Boris Jr., Boston, Little, Brown and Co., 1969. (Intermediate).

THE SEA AROUND US, Carson, Rachael. New York, Simon and Shuster, 1958. (Intermediate).

THE STORY OF OCEANOGRAPHY, Boyer, Robert E. New York, Harvey House, 1975. (Intermediate).

OCEANOGRAPHY, Carr, Marion B., Racine, Wisconsin, Golden Press, 1973. (East/color illustrated).

Reference Section

ILLUSTRATED LIBRARY OF NATURE - AN ENCYCLOPEDIA OF NATURAL HISTORY AND ECOLOGY. New York, H.S. Stuttman Co., 1971, Volumes 10-11-12.

THE OCEAN WORLD OF JACQUES COUSTEAU. Danbury Press, 1973. Volumes 1-20 and index. (Excellent for all grades/color photo).

Science-Math Resource Center

Books:

THE LIFE OF THE OCEAN, Berrill, N.J. McGraw-Hill, 1966.

OCEANOGRAPHY AND OUR FUTURE, Oxeborn and Goldfeld, Globe, 1975.

OCEANOGRAPHY, Milliken, 1968 (dittos and transparecies).

MOBY DICK, adapted by Sutton, Felix. Grosset and Dunlap, 1958. (Young readers).

Set:
LIFE AND DEATH IN A CORAL SEA, Cousteau, Jacques-Yves, Doubleday, 1972.
OCTOPUS AND SQUID, 1970.
THE SHARK, 1970.
DIVING COMPANIONS - SEA LION - ELEPHANT SEAL - WALRUS, 1974.
THE WHALE MIGHTY MONARCH OF THE SEA, 1972.

UNIT: OCEANS

Step VII. Resources

PLANTS AND ANIMALS - GRADES 5-8 CONTINUED

Filmstrip:
LIFE IN THE SEA, National Geographic Society, 1978.

Science Programs:
SCIS - POPULATIONS Level 3 (Food Chains).
IIS - LIFE SCIENCE Food Chain Game 11:4.

Games:
PREDATOR - THE FOOD CHAIN GAME.

Kits:
WHALING - PEOPLE IN TECHNOLOGY
Booklets, equipment, activities, filmstrips, movie (Dr. Paul Markovits).

MSU Bookstore
THE MARINE BIOLOGY COLORING BOOK, Nieson, Thomas M. Barnes and Noble Publishers. (Excellent for all grades).

Department of Instructional Media - Bozeman Public Schools

MP 525	THE LIFE CYCLE OF THE SALMON	COLOR	IJH	10 MIN.
MP 221	ECOLOGY OF THE OCEAN	COLOR	IJ	8 MIN.
MP 573	MAN IN THE SEA: THE NEW FRONTIER	B & W	JH	14 MIN.
MP 754	STAKING OUT THE OCEANS	B & W	JHA	13.5 MIN.
MP 189	MOLLUSKS - SNAILS, MUSSELS, OYSTERS, OCTOPUSES AND THEIR RELATIVES	COLOR		14 MIN.

UNIT: OCEANS

Step VII. Resources

INDUSTRY - GRADES K-4

ESKIMO BAY, Feuchen, Pipaluk
ESKIMO OF LITTLE DISMEDE, Mayberry, Genevieve
ESKIMOS, Bleeker, Sonis
FIRST BOOK OF ESKIMOS, Brewster, Benjamin
ESKIMOS, Herbert Wally
MEN AT WORK IN HAWAII, Rubicana, Henry
HAWAII A BOOK TO BEGIN ON HAWAII, Swenson, J.M.
HALEAKALA NATIONAL PARK, Radlauer, Ruth
HAWAII GEN OF THE PACIFIC, Lewis, Oscar
HAWAIIAN HEART, Tabrah, Ruth
HAWAII, THE ALOHA STATE, Bauer, Helen
HAWAII, Carpenter, Allan
HAWAII U.S.A., Edelman, Lilly
LET'S TRAVEL IN HAWAII, Geis, Darlene
GETTING TO KNOW HAWAII, Laschever, B.D.
JOBS PEOPLE DO, Moncure, Jane
WHAT DO YOU DO?, Anacona, George
THE WAY WE LIVED, Sandler, Martin
THE HOW AND WHY WONDER BOOK OF SHIPS, Scharft, Robert
HARBOR, Crew, Donald
SAM BANG AND MOONSHINE, Ness, Evaline
THE GREAT STEAMBOAT MYSTERY, Scarry, Richard
THE YOUNGEST CAPTAIN, Williams, Jay
THY FRIEND OBADIAH, Turkle, Alvin
THE GIANT BOOK OF THINGS THAT WORK, Zaffo, George
THE SMALLEST PIRATE, Trag, Alain
THE LADY OF THE SEA, Anrooy, Erans
THE BOAT THAT MOOED, Fry
WHAT WHALE? WHERE?, Hurd, Judith
THE MAGGIE B, Haas, Irene
BLUE SEA, Crews, Donald
THE DAY THE HURRICANE HAPPENED, Anderson, Lonzo
THE DEEP DIVES OF STANLEY WHALE, Benchley, N.
SAILOR'S CHOICE, Carlson, N.

UNIT: OCEANS

Step VII. Resources

TRANSPORTATION - GRADES K-8

SHIPS AND BOATS, "Let's Discover Series," Vol. 13, Raintree Publishers.
WOODEN SHIPS, Adkins, Jan. Boston, Houghton Mifflin, 1978.
SHIPS OF COMMERCE: LINERS, TANKERS, FREIGHTERS, FLOATING GRAIN ELEVATORS, TUGBOATS, Colby, C.B. New York, Coward, 1963.
ALFRED BULLTOP STORMALONG: DEEPWATER SEASMAN, SVE, Singer Company.
TEACHING SCIENCE THROUGH DISCOVERY, 5th Ed., Carin, Arthur A. and Robert Sund Columbus, Ohio, Charles E. Merrill Publishing Company
A LIZARD TO START WITH 360 Reading Series, Ginn.
SCIENCE ENCYCLOPEDIA, Vol. 13, Raintree Publishers
OCEANOGRAPHY AND OUT FUTURE, Oxhorn and Goldfield

FILM:
BOATS AND SHIPS, 10 min, P-I, Educational Film Locator, 1980.
SHIPS: A FIRST, 11 minutes, P-I, Educational Film Locator, 1980.

History text books
Science books
Encyclopedias

Environmental Records - Sounds of Ships, found in Resource File, Teachers' Resource Center.

UNIT: OCEANS

Step VIII. Evaluation

The following outlines a suggested formal evaluation format to utilize when teaching with this unit.

The blank form is intended to be reproduced for multiple use. The completed form is a sample of how to use the blank form.

EVALUATION WORKSHEET

Unit: _____

Sub-unit: _____

Core Area: _____

Student's Name: _____ _____ _____ _____ _____

Instructional Objectives	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	TEACHER NOTES

1. Does not demonstrate competence
2. Demonstrates competence
3. Mastered

BEST COPY AVAILABLE

UNIT: OCEANS

Appendix A: Sub-Unit Assignments

Hillary Donaldson
Pat Hopper
Gladys Kauffman
Clint Loomis
Lyn Morton
Linda Rice